

Division of Cancer Control and Population Sciences

Workgroup Report: Challenges to Diet/Energy Balance Epidemiology Research

**Presented at: First NCI Epidemiology Leadership
Workshop: Tobacco, Diet, & Genes – Chicago, IL
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Initial Topic Areas

- ▶ **Integration of diet/weight and physical activity**
- ▶ **Biomarkers for diet**
- ▶ **Genetic susceptibility and diet interactions**
- ▶ **Dietary assessment**
 - ▶ Self report
 - ▶ Measurement errors
 - ▶ Food patterns versus food versus nutrients
- ▶ **Population coverage**
 - ▶ Limited data on diverse groups
 - ▶ Examining patterns in low- and high-risk groups
 - ▶ Populations with rapidly changing rates

Initial Topic Areas *(Continued)*

- ▶ **Variation in risk across the life cycle**
 - ▶ Pre/post natal
 - ▶ Childhood
 - ▶ Adolescence
 - ▶ Young, middle and older adult periods
- ▶ **Utility of different designs for investigation of diet/gene interactions**
 - ▶ Case-control
 - ▶ Cohort
 - ▶ Randomized, controlled interventions

Integration of Diet/Weight and Physical Activity



► State of the Science:

- Obesity relationship established
- Physical activity (PA) importance
- Independent effects of diet, PA & obesity unknown

Integration of Diet/Weight and Physical Activity



► What are the gaps in the science?

- Intervention studies needed
 - Small scale studies
 - Community level interventions
- Better PA assessment & detail
- Understanding other social & community level factors
- Better tools to measure diet/PA change
- Life cycle differences
- Role in rare cancers

Integration of Diet/Weight and Physical Activity



- ▶ **What are the methodological issues and barriers?**
 - ▶ **Tools – standardized vs. study-specific**
 - Measurement of change
 - ▶ **Collect diet & PA data at same point & time**

Integration of Diet/Weight and Physical Activity



- ▶ **Where is the science going?**
 - ▶ Community intervention
 - ▶ Measurements at various times in life cycle
 - ▶ Obesity initiatives

Biomarkers for Diet



- ▶ **State of the Science**
 - ▶ **Currently no good measures for diet**
 - ▶ **Should markers focus on nutritional status or on diet intake?**

Biomarkers for Diet



- ▶ **What are the gaps in the science?**
 - ▶ Need for more sensitive biomarkers of interaction of exposures and effect on DNA
 - ▶ Currently measure serum &/or urine biomarkers – is this adequate?
 - ▶ Biomarkers for foods vs. food patterns

Biomarkers for Diet



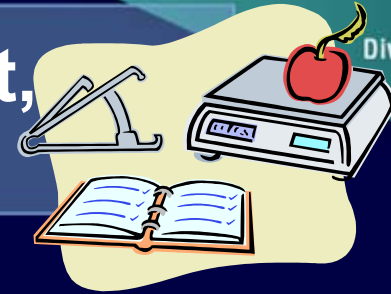
- ▶ **What are the methodological issues and barriers?**
 - ▶ **Currently measure serum &/or urine biomarkers – is this adequate?**
 - ▶ **If biomarkers are available – how is the data interpreted?**

Biomarkers for Diet



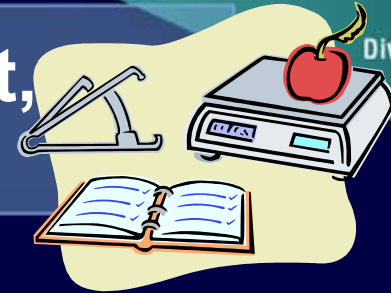
- ▶ **Where is the science going?**
 - ▶ Better measures of nutritional status
 - ▶ Biomarkers for energy balance
 - ▶ Need for improving/developing biomarkers that incorporate metabolism (intersection with other exposures)

Dietary Assessment – Self Report, Measurement Error, Patterns



► State of the Science

- Self-report (FFQ) standard method in cancer epidemiology
- Recognize measurement error
- Interest in foods, nutrients, dietary patterns (captured by one instrument)



Dietary Assessment – Self Report, Measurement Error, Patterns

► What are the gaps in the science?

► Life cycle

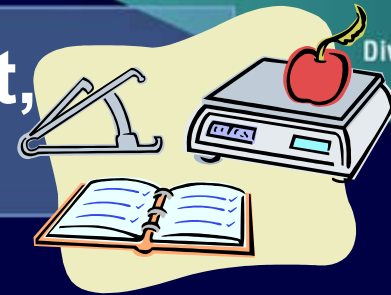
- Retrospective assessment
- Different assessment tools for different life stages
- What is the best time to measure diet for cancer etiology?

► Diet in cancer treatment – tumor effect

► One-time measurement

► Self-report vs. interview

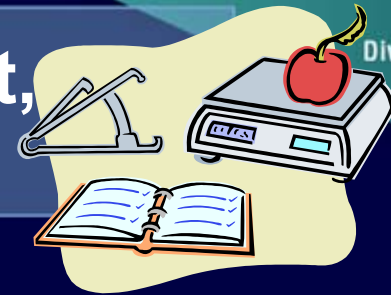
Dietary Assessment – Self Report, Measurement Error, Patterns



► What are the methodological issues and barriers?

- Combining data across studies
- Consider development of statistical analytic methods for foods and food patterns from existing data
- Exposures in childhood
- Studies in cancer patients during treatment and in survivorship (disease and treatment could alter nutrient metabolism - different effects than in general population)
- Use of alternative diet tools

Dietary Assessment – Self Report, Measurement Error, Patterns



► Where is the science going?

- Need for assessment of dietary change in intervention (or observational studies)
- Different approaches
 - patterns vs. nutrients;
 - purchase patterns;
 - development of biomarkers
- Better assessment of energy intake
- Diet trends – effect on cancer risk
- Life cycle appropriate methods

Genetic Susceptibility and Diet Interactions



▶ State of the Science

- ▶▶ SNPs & interactions w/ dietary factors
- ▶▶ Haplotype vs. SNPs
- ▶▶ Weak diet effects + weak gene effects means need for large sample size

Genetic Susceptibility and Diet Interactions



- ▶ **What are the gaps in the science?**
 - ▶ Wide variation in genetic associations
 - ▶ Studies are underpowered
 - ▶ Application of advances in statistical methods
 - ▶ Are genes enough?
 - Expression profiles
 - Metabolomics
 - ▶ Effects of factors not measured (e.g.: drugs, etc.)

Genetic Susceptibility and Diet Interactions



- ▶ **What are the methodological issues and barriers?**
 - ▶ Need for large studies means inadequate replication of findings
 - ▶ Statistical methods for handling large data sets
 - ▶ Better understanding of what genetic measurement to use

Genetic Susceptibility and Diet Interactions



- ▶ **Where is the science going?**
 - ▶ Major emphasis on genetics
 - ▶ Large consortia
 - ▶ Multi-disciplinary teams
 - ▶ Macro-level factors need to be studied
 - ▶ Question clinical/public health relevance

Population Coverage- Limited Data, Low- & High-Risk Groups; Rapid Change



► Major issues:

- Need to ensure continued efforts, including international studies
- How to incorporate non-US foods (e.g., from recent immigrant populations) within research nutrient composition databases
- Opportunities may exist – trans NIH-funded studies

Variation in Risk Across the Lifecycle



► Major issues:

- Appropriate assessment at various time points
- What time is most relevant?
- Not just diet, physical activity – covariates may change or how they are assessed may differ



Utility of Study Design for Diet/Gene Interactions

► Major issues:

- New large cohorts vs. continuation of existing cohorts
- Innovation vs. need for common measures for pooling
- Suggest funding mechanism for statistical &/or methodological issues (large data sets)
- New studies for energy balance issues related to breast cancer survivors

Other Important Areas

- ▶ **Dissemination (e.g., obesity)**
- ▶ **Innovative technologies**
- ▶ **Progression and survival**

Next Steps

- ▶ **Polling attendees re: continued involvement & logistics**
 - ▶ Meet at national meetings (AACR)
 - ▶ Conference calls
- ▶ **Identify key topics; probable smaller working groups / subgroups**
- ▶ **Potential for workshops to learn from other fields**
- ▶ **Coordination across ICs if appropriate, e.g., obesity**